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ABSTRACT

According to the National Safety Council, the leading cause of accidental deaths for infants under 1 year old, and the fourth most frequent cause of death for children 1 to 4 years old, is choking on things they try to swallow. This paper indicates the dimensions of the problem and lists foods involved in choking deaths of children. Methods of preventing the obstruction of the airway include: (1) selecting and preparing foods carefully; (2) positioning children with care at meals; (3) avoiding excitement and unnecessary movement at mealtimes; (4) avoiding overstuffing the mouth; (5) providing adequate fluids; (6) keeping adult foods safely away from children; (7) observing children carefully during and after meals; and (8) being prepared for emergencies. (RH)

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WHY YOUNG CHILDREN CHOKE ON FOOD: HOW TO PREVENT IT

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HOW TO PREVENT YOUR CHILD FROM CHOKING ON FOOD

Working with young children should be a fun and carefree experience. None of us likes to think of tragic or frightening events. Yet unless we know the risks that life presents, we cannot take appropriate precautions against them. Choking on food is a serious risk for young children, causing hundreds of deaths each year. Most of these deaths could be eliminated by a few simple precautions. This paper presents some simple steps that parents and other caregivers can take to prevent their children from choking.

The Problem

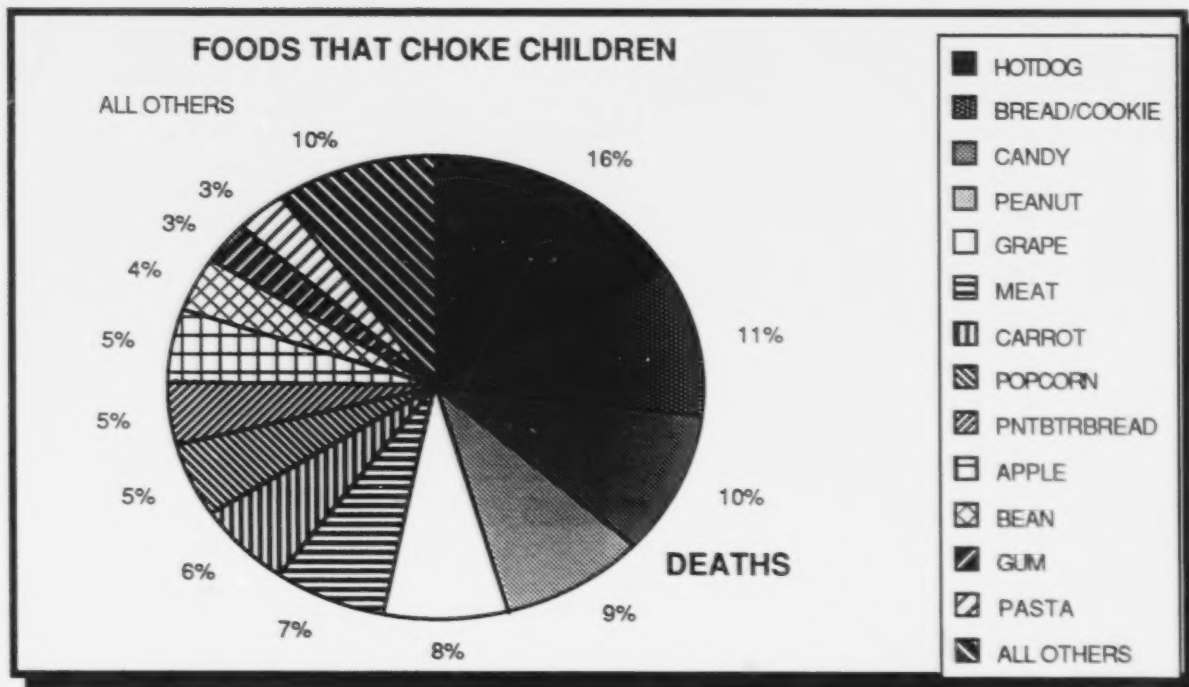
In the United States the Consumer Product Safety Commission's enforcement of the Poison Prevention Packaging Act led to a 34 per cent decrease in accidental poisoning of children under five-years-old between 1974 and 1980. The use of child safety seats, now required by law in most states and provinces, is estimated to reduce injuries and fatalities for children using safety seats when accidents occur by 80 to 90 percent. These efforts to protect children have saved many lives, but sadly one of the greatest dangers to children (especially those under five) remains uncontrolled. According to the National Safety Council, the leading cause of accidental deaths for infants under one-year-old and the fourth most frequent of death for children under one to four-years old (auto-accidents, drowning, and burns rank 1,2, and 3) is choking on things they try to swallow.

Since figures from the National Safety Council include both food and non-food items, one might assume that the majority of cases occur when babies put non-food items into their mouths. A recent nationwide study by Harris and her colleagues at Johns Hopkins University,

however revealed that many if not most of the fatal choking incidents involving children were food related. (Comparison of their findings to National Safety Council's statistics suggests that about 60 percent are food related). Furthermore, they found that where specific foods were identified, four foods were responsible for more than 40 percent of fatalities. Hot dogs and sausages caused 17 per cent (70 per cent of three-year-olds!) of these fatalities and other studies have implicated them in as many as one-third. Candy was responsible for another 10 per cent of fatalities. Nuts (most commonly peanuts) were the cause of 9 per cent, and grapes were the cause of another 8 percent. Certain foods appear to present greater risks at specific ages. For example, apples and cookies were responsible for more than a third of the infant food choking deaths under one-year-old. Figure 1 summarizes data from Harris and her colleagues.

Ironically, the Consumer Product Safety Commission's 1979 standards to reduce choking hazards applies to toys but not to foods which present a significantly greater risks. Although some voluntary efforts have been undertaken to label hazardous foods, the responsibility for protecting children from choking remains with parents and other caregivers.

CHOKING DEATHS IN CHILDREN



NUMBER & AGE RANGE OF DEATHS IN STUDY

FOOD	NUMBER	AGES
HOTDOG	17	0-3
CANDY	10	0-9
PEANUT	9	0-2+
GRAPE	8	0-4
MEAT	7	1-9
COOKIE / BISCUIT	7	0-1
CARROT	6	1-2
POPCORN	5	0-1
PEANUT BUTTER & BREAD	5	1-4
APPLE	5	0-1
BEAN	4	0-2
BREAD	4	1-2
CHEWING GUM	3	0-9
MACARONI / NOODLE	3	1-2
ALL OTHERS & UNCERTAIN	10	

[+ INDICATES SOME CASES OUTSIDE OF RANGE]

BASED ON 103 CASES STUDIED BY HARRIS, BAKER, SMITH & HARRIS (1984)

Figure 1. illustrates the relative incidence of choking incidents that cause death resulting from various categories of food.

CHOKING PREVENTION

Some relatively simple precautions can greatly decrease children's risk, but before looking at them, it would be helpful to understand more about what causes airway obstruction.

How Choking Occurs

To maintain life, breathing must be a continual process. In children, this means that inhalation and exhalation must occur twenty or thirty times per minute and thirty to fifty times per minute in infants. Since the upper part of the airway carries both food to the esophagus and air to the larynx, eating and drinking must be carefully coordinated with breathing. Each time food or drink is about to be swallowed, the *epiglottis* (a lid composed of muscle and cartilage) closes to seal off the airway. Once the airway is sealed off, swallowing occurs, and after swallowing the airway reopens. This process takes place automatically and is generally quite dependable.

Occasionally, something goes wrong with this process. Food or fluids may enter the airway if the epiglottis does not seal it off completely. Food may also get caught in the throat just above the entrance to the airway. Although no food enters the airway, the epiglottis may be trapped in a closed position by food caught in the throat, and the airway is obstructed. If the airway is only partly obstructed, discomfort, coughing and tears typically follow. Generally, however, enough air will get in and out to maintain vital functions until the obstruction is removed. If the airway is completely obstructed (or almost completely obstructed), the obstruction must be removed immediately to save the child's life and prevent permanent damage.

Once objects are caught in the airway, they are difficult to remove because the airway constricts and holds them tighter as the child tries to exhale and inhalation pulls the obstruction further in rather than expelling it. Similarly, an object caught in the throat stimulates peristalsis (rhythmic contractions) to try to swallow the object. If

the object cannot move downward, these contractions may hold it more firmly in place.

Not all of the causes for objects becoming caught in the throat or airway are known, but some have been identified. Trying to swallow too much food at one time probably is the major cause of food becoming caught in the throat trapping the epiglottis. Foods that have a shape and size that conforms easily to the child's throat (e.g., peanuts) carry increased risks. Foods that are compressible (e.g., bread) may be shaped by swallowing to become wedged in the throat.

Slippery foods (e.g., fruit seeds) may slide into the airway before the child intends to swallow. Interruptions in the natural rhythm of eating and swallowing may also result in food entering the airway. Sudden movement or changes in posture can also result in food entering the airway.

Preventing Airway Obstruction

Several measures can be taken to reduce the risk of choking at mealtimes. A number of these are discussed briefly below.

Select Foods Carefully. Foods that carry the greatest risk probably should not be given to children under four-years-old. Hot dogs, sausages, peanuts, grapes, hard candies, toffee, cherries with pits and other suspect foods are all associated with increased risk. Careful preparation reduces the risks for some foods, but is more effective for some than others. For example, quartering grapes greatly reduces the risk, but hotdogs may cause choking even when cut into tiny pieces because the compressibility of the roll and cereal filler can result in the formation of a compact ball of food.

Prepare Food Carefully. Young children often cannot or do not chew food adequately. Apples, carrots, meats, and other foods should be cut into small enough

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pieces that they could be easily swallowed whole by your child. Shredding or grating helps ensure safety. Grinding food into small pieces is desirable, but a diet of pureed foods with little solid texture is not recommended because exposure to solids is necessary for children to develop normal chewing and swallowing patterns.

Position Your Child Carefully.

Children should eat in an upright sitting position, never laying on their backs. Encourage children to keep their heads upright or slightly flexed (with chin slightly down toward chest). This encourages closing of the epiglottis during swallowing and decreases the risk of food slipping back into the throat before swallowing begins. Do not allow children to eat with their heads extended back, since this tends to keep the airway open and lets food slip back out of the mouth. To encourage this, if you are spoon feeding your child, sit on a low chair so that your child looks down to make eye contact with you or to look at the approaching spoon.

Avoid Excitement and Unnecessary Movement.

Mealtimes should be fun, but excessive vocalization, laughter, and sudden movements at mealtimes increase the chance of food entering the airway. Interaction should be encouraged at meals, but games like peek-a-boo and tickling can have disastrous consequences. A relaxed, calm, but positive atmosphere will be much safer.

Avoid Overstuffing the Mouth.

Some children when they begin self-feeding will put as much food in their mouths as fast as they can. They will often attempt to swallow large mouthfuls of inadequately chewed foods. If a child does this, you must slow down the process. Several methods can help. Verbal reminders to slow down are successful with some children, especially older ones. Younger children may require pacing or delay procedures. Pacing is easily carried out by giving the child only one piece of food at a time. Only after one piece is

chewed and swallowed is the next piece given. Delay procedures interrupt the child's eating for 15 to 30 seconds if the pace becomes too fast. Usually, the interruption is carried out by removing the plate. The child soon learns (if the procedure is carried out consistently) that attempting to eat too fast only slows things down more, and the pace usually moderates quickly. Another simple method of keeping the pace under control is to make certain that the child isn't allowed to become too hungry between meals.

Provide Adequate Fluids.

Keeping the mouth and throat moist helps lubricate them for swallowing. Giving drinks between pieces of bread and dry foods helps with swallowing them.

Keep Adult Foods Safely Away.

Even when parents and other caregivers know not to offer their children hazardous foods, children may eat them. The peanut, cherry pit, or unpopped kernel of corn that accidentally drops on the floor is a tempting morsel for a one-year-old. Great care must be taken to eliminate these attractive hazards from the child's environment. This may be accomplished by selecting other food alternatives for adults in the house, restricting these foods to specific areas of the house, exercising extra care about dropping food and/or careful clean-up routines.

Observe Carefully During and After Meals.

Careful observation during meals allow parents to recognize potential problems (e.g., too much food in the child's mouth) and take action (e.g., empty child's mouth before the child attempts to swallow). Observation should continue after meals since foods may remain concealed in the child's mouth of clothing to be swallowed later. Also, infants and young children may spit-up undigested food and choke on it after meals. For this reason, it is not recommended to put a child to bed (especially on his or her back) within half an hour after eating. Remember that direct

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visual supervision is needed since the child with an obstructed airway cannot cry, cough or otherwise vocalize to let you know something is wrong.

Be prepared. In spite of our best efforts to prevent children from choking, this emergency can still occur. If it does, you must be prepared to recognize and treat the problem quickly. Since death will likely occur within five minutes for a small child, outside help rarely arrives in time. The best training for first aid comes from direct face-to-face instruction such as that offered by the American Red Cross, or Saint John's ambulance. Both of these groups recently modified their procedures for airway obstruction. The Heimlich maneuver is now recommended and other methods such as back blows that were previously used have been discontinued. Most victims would be saved if parents and other caregivers knew and used these methods. All people involved in the care of young children should be fully trained in use of the Heimlich Maneuver, and diagram of the procedure should be posted in locations where groups of young children eat.